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AUTHOR Gupta, Nina
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ABSTRACT

This paper summarizes findings from research undertaken to examine the effects of various school, classroom, and teacher characteristics on student achievement. It uses recent literature reviews and longitudinal studies from the ERIC database that focus on the relevant variables. Detailed discussions are offered of classroom variables--class size, grade level and curriculum area, social skills, and team teaching; teacher variables--sex of the teacher, conceptual structures, and control strategy feedback; and school variables--administrative behavior, school climate, organizational structure, open-space schools, structured classes, teacher stability, and grade retention. One of the findings shown is that emphasizing the learning of social skills in the classroom may facilitate academic achievement. Also, the style of teaching used by a teacher in the classroom could have a significant impact on student learning as would providing teachers with appropriate feedback regarding their teaching styles. Implications for policy and for further research are discussed in detail. (Author/LD)

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Further information may be obtained from the Southwest Educational Development Laboratory, 211 East 7th Street, Austin, Texas 78701.

James H. Perry
Executive Director

Martha L. Smith
Director, Regional Planning
and Service Project

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Some School and Classroom Antecedents of Student Achievement

Prepared by
Nina Gupta

June 1979

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INTRODUCTION

A growing concern in recent years has been the declining achievement levels of elementary and secondary school students. Research to determine the antecedent conditions of this phenomenon has taken two parallel directions. First, a variety of remedial programs have been implemented (e.g., Project Head Start) that attempt to correct the apparent disadvantages experienced by children who are socioeconomically deprived, or who suffer from physical and/or emotional handicaps. Second, some research endeavors have undertaken an examination of the effects of various school, classroom, and teacher characteristics on student achievement.

The present report attempts to summarize findings from the latter body of research, using literature reviews and longitudinal studies as the primary data sources. Before the substantive findings are discussed, the parameters for this review will be outlined. The reader is cautioned to keep these parameters in mind when evaluating the ensuing pages.

First, the primary source of material was the ERIC database. Second, only literature reviews and longitudinal studies focusing on the relevant variables were included in this review. Third, the review was limited to relatively recent works (by recent, we largely mean documents that have appeared since 1974). Finally, reports that focused on such relatively permanent characteristics of individuals such as race and IQ, were excluded from the review. The primary reasons for the specification of such a narrow scope centered on constraints of time and money. Additionally, the major thrust of this review was an elucidation of aspects of the school environment that could be altered with relative ease. It was felt that permanent individual characteristics that may affect student achievement, while an interesting area of study, are quite resistant to the potential impact of intervention efforts.

Within these parameters, the amount of quality of the relevant literature were somewhat disappointing. By far the greatest quantity of work has been done in the area of the relationship of class size to student achievement. Other teacher and school characteristics have remained relatively unexplored except as a tangential field of inquiry. Among some of the other areas that have received sporadic attention are the classroom reward structure, the social communication pattern within the school, the impact of desegregation, etc. Each of these areas will be reviewed briefly below with a view toward eliciting policy and research implications from the studies.

It is prudent to reiterate at this point that the present study focuses on literature reviews and longitudinal studies that have been published within the last four or five years. Thus, individual studies such as those reporting cross-sectional examinations of the relationships among isolated variables and studies conducted in the early 1970's do not fall within the purview of the present study. Finally, since the ERIC database was used as the primary source of materials, it is possible that some significant research reported in journals and books not covered by ERIC have been omitted from the present effort. In general, however, we feel confident that the following report provides an adequate representation of the current research within the scope of the specified parameters.

Classroom Variables

Class Size. The research on class size suffers from several problems which partly explain the inconsistency of the documented relationships of this variable with student achievement. These methodological problems have been discussed in detail in many review pieces on the issue of class size. One of the major problems centers on the definition of large and small

class sizes. What some researchers consider to be small class size (e.g. twenty-five) constitutes a large class size for others. Similarly, the issue of student-teacher ratio has been confused with student-staff ratio. Thus, the implications that can be drawn from the existing class size research are, at best, tentative. In general, the research indicates that sometimes small class sizes are preferable, particularly in the earlier grade levels. More important is the quality of student-teacher interactions and the methods and techniques employed by teachers in the classroom. Frequently, smaller class sizes facilitate improvement in the quality of interactions between teachers and students, and allow greater flexibility in matching teaching styles with student needs. Larger class sizes, on the other hand, place greater demands on the teacher and frequently necessitate standardization of procedures and techniques across students, thus minimizing the amount of individualized instruction that a teacher is able to impart.

In exploring the effects of class size on student achievement, researchers have posited a variety of intervening mechanisms that determine the relationship between the two sets of variables. For example, Wolfe (1976) posits that small classes can benefit the personal development and emotional well-being of students by avoiding the alienation and stress produced by larger groups. Similarly, David (1976) notes that the issue of class size may be more one of alienation than one of best educational practice. Pidgeon (1974) attributes the failure of class size research in providing an unequivocal support for smaller classes to the widespread use of traditional mass teaching methods, which seem to be equally effective for different class sizes.

Among the conclusions drawn about the relationship between class size and student achievement in one research report (Educational Research Service, 1978) are the following:

- The relationship between the two sets of variables is highly complex.
- The effects of class size on pupil achievement across all grade levels are contradictory and inconclusive.
- There is no support for the notion of an optimum class size.
- Efficient class sizes are a product of many variables including: subject area, nature and number of pupils in the classroom, nature of learning objectives, availability of materials and facilities, instructional materials and procedures used, skills and temperament of the teacher and support staff, and budgetary constraints.
- The effects of class size on student achievement vary with grade level.
- The effects of class size on student achievement vary with student characteristics.
- Certain teaching procedures and practices perceived by some educators as conducive to a productive learning environment occur more frequently in smaller classes than in larger classes, but this finding is still tentative.
- The benefits of smaller class sizes are negated if teachers continue to use the same methods and procedures in smaller classes than they did in the larger ones.
- Since the time span for most of the studies was relatively short, little is known about the long term effects of small classes.

Similar conclusions have been drawn in other reviews of class size research. The following quotation serves as an illustration:

> "Fraught with problems of definition, measurement, and quality, the (class size) research offers little sure and undisputed knowledge and little likelihood of a quick resolution. It says with certainty only that the teaching-learning process is complicated and affected by many varibles and that class size has little powerful and uniform effect by itself.
>
> In the face of such conclusions, educators will have to fall back on common sense and experience and the general trends presented by the research evidence. Smaller size, it appears, contributes to desirable process, though its full impact on process demands the use of student centered teaching methods.

> These process benefits have not yet generally been proved to result in greater student achievement. Larger classes can be as effective as smaller classes, especially when compensatory arrangements are made. Variations in class size seem to have the most impact at the elementary level.
>
> Smaller classes remain desirable for quality education and are widely valued, but they offer no guarantees. Policy-makers can best respond with a class size policy of flexibility, one that adjusts size to the particular ends and circumstances of individual classes. While educators await more definitive research, administrators and teachers can best solve their differences over class size through mutual compromise and creative collaboration." (Thompson, 1978, p. 30).

Using a relatively new technique, (meta-analysis) to review the literature on class size and student achievement, Glass and Smith (1978) found that, on the average, student achievement increases as class size decreases. They also found that this relationship was generally not evident in studies conducted before 1940. Furthermore, the size effect was much more convincing in well-designed and well-controlled studies than it was in poorly designed and executed studies. Since the latter group studies constitutes a large portion of research on class size, the inconclusive results frequently reported in size reviews is hardly surprising. Finally, the researchers noted slightly stronger advantages of small class sizes at the secondary than at the elementary levels.

Many researchers have argued in favor of a modifiable arrangement with respect to class size. For example, David (1976) argues that size remains a "mediating variable" that "cannot be divorced from context," while Holland and Galto (1964) posit that the best hope for the future is to provide students with opportunities to learn in both large and small groups, the selection of group size being determined by teaching objectives. Similarly, it has been argued that small classes are justified only when educators accept the presupposition that learning is more important than teaching and accordingly employ methods that increase

student-teacher interaction. Appropriate size will also depend on staffing arrangement and classroom organization, teacher workload, teacher style, subject, grade level, and the relationship of the classroom to the total school organization (Pidgeon, 1974).

Given these widely divergent studies, Ryan and Greenfield (1976) concluded that "we can conceive of no research study or group of studies which will immediately and unambiguously resolve the question of how many children should be placed in a classroom and how many people of what kinds should be responsible for helping them to learn effectively."

Other Classroom Variables. There is some research examining the relationship between student achievement and various characteristics of the classroom. One such variable of interest is the reward structure that is ued in the classroom. "Classroom reward structures refer to the performance criteria, contingencies or standards that students must satisfy in order to receive presumably valued or enforcing consequences such as prizes or high grades" (Michaels, 1977, p. 87). Rewards may be structured such that individual competition, individual cooperation, group competition, or group cooperation is encouraged.

One review of the relationship between classroom reward structures and student achievement came to the following conclusions:

"1. The laboratory or laboratory-like research on interpersonal reward structure reviewed here supports a conclusion that unless subjects have important resources to share or withhold at their discretion, competitive and individual reward structures are more effective than cooperative ones for increasing performance.

2. Classroom research over significant periods of time comparing the effects of different reward structures on performance has been scant, but there is reason to believe that further research with certain kinds of small-group cooperative structures may yet produce achievement gains for such structures.

3. Consistently positive effects of cooperative reward structures on social connectedness dimensions point to an important reason for continuing the search for effective cooperative reward structures--that it may be possible to permanently change the climate of the classroom in a way that promotes mutual attraction and acceptance among students.

4. Mixtures of competitive and cooperative or cooperative and individual reward structures appear to be the most promising avenues for producing positive effects both on academic achievement and on social connectedness."
(Slavin, 1977, p. 647)

In a similar vein, another review came to the following conclusions:

> "The most striking pattern is the consistency with which individual competition was the most effective reward structure implemented in strengthening the independent task performances of students. Specifically, individual competition was more effective than group competition in six studies..., more effective than individual reward contingencies in two studies..., and more effective than group reward contingencies in two studies...
>
> Because of infrequent comparisons, conclusions regarding the relative effectiveness of other reward structures compared must be regarded as tentative. Specifically, individual and group reward contingencies were equally effective in one study..., and individual reward contingencies and group competition were equally effective in another... In one study, group competition was more effective than group reward contingencies..., but in another...they were equally effective." (Michaels, 1977, pp. 93-95).

The research data, therefore, appear to indicate the superiority of individual competition in promoting the academic achievement of students. Proponents continue to argue in favor of a more detailed examination of the effects of cooperative group reward structures. The general consensus seems to be that, with further study, the effectiveness of group cooperative reward structures in promoting student achievement will be demonstrated.

A review of the studies on the effects of grade level and curriculum area led Randhawa and Fu (1973) to the following conclusions:

> "...Classroom learning climates are apparently a function of curriculum area and grade level. The differences in classroom learning climates, rated by pupils or recorded by trained observers, presumably reflect the receptivity of learners toward the central concepts in a course. The monotonic decrease in rating of the quality of climate as the grade level increases may suggest two tentative conclusions. First, schools adversely affect the predisposition of learners. If this conclusion is substantiated by well-designed, representative, cross sectional and/or longitudinal studies, curriculum makers and organizational innovators would face the toughest challenge of this century to rectify the situation in order to justify the existence of the formal school. Second, learners become overly critical with development. The accountability of proof of this proposition will rest with the educational psychologists." (p. 307)

In examining these conclusions, it must be kept in mind that the researchers were looking at learning climate, and not student achievement, as the dependent variable. The relationship between learning climate and student achievement, however, is not clear. Thus, a report that style of educational activity (lecture, discussion, demonstration) is related to learning climate is not enough. Whether grade level and curriculum area do have an impact on the achievement of students has still to be established definitively.

Social skills on the part of students is yet another variable that has been related to student achievement. Cartledge and Milburn (1978), for example, came to the following conclusions with respect to the case for social skills:

> "Although concerns are sometimes expressed about the tendencies for schools to encourage and perpetuate obedient, controlled, conforming behavior in classrooms, evidence from various sources indicates that such behaviors are correlated highly with academic achievement. Such behaviors are correlated highly with academic achievement. Such behaviors as attending, remaining on task, volunteering answers, complying with teacher requests, and interacting with teachers and peers about school work have been shown to bear a positive relationship to success in learning. Children labeled as

> underachievers or learning disabled have been demonstrated to lack these behaviors. Studies of teacher opinion about social behaviors of children suggest that teachers generally prefer children who pay attention, follow directions, and work hard. Teachers respond differentially toward children who display diffrent behaviors, and there are data to establish that responding behavior of teachers can be shaped by varying student behavior. The specific teaching of behaviors such as attending and interacting with the teacher have not only resulted in increased positive behavior from the teacher, but it appears that teaching these social skills will also increase academic learning." (pp.150-151)

Another classroom variable of potential interest is team teaching versus the use of solitary teachers in the classroom. The research on this variable is sporadic and not very rigorous, minimizing the likelihood of a definitive answer regarding the superiority of one approach over another. Armstrong (1977) concluded, therefore, that "many of the studies reviewed ...reported findings of no significant differences in achievement scores of team-taught and solitary teacher-taught learners." He concluded further that:

> "In summation, one is struck by the very basic nature of the questions for which research has failed, after fifteen or more years of team teaching to supply at least tentative answers. Team teaching, it is evident, represents one of those educational practices that have not been subjected to truly intensive and systematic investigation. Support for team teaching has been more of a validation through affirmation than a validation based on empirical evidence. At this juncture, little in the research literature provides solace either for team teaching's critics or its most ardent supporters." (p. 83)

From these results, it can be concluded with relative ease that currently the choice between two methods of teaching should be based on feasibility considerations rather than on the demonstrated superiority of one approach over the other.

Teacher Characteristics. Not surprisingly, various researchers have devoted some attention to the personal and professional characteristics of

teachers that may be related to student achievement. Vroegh (1976), for example, reviewed the research on the relationshipn between the sex of the teacher and academic achievement of students. Starting from the documentation of frequent academic problems among boys in elementary schools but not among girls, it was hypothesized that the academic problems among boys may stem from the low employment levels of male teachers in elementary schools. This, in turn, may lead to an absence of role models for boys, as well as to an increased frequency of rewarding 'feminine' behaviors in the classroom. Vroegh's review indicated, however, that it was not the sex of the teacher per se, but rather the kinds of classroom techniques adopted by teachers of either sex, that are relevant to the academic achievement of students.

> "I propose that male teachers as well as female teachers need training in understanding the individual child--boy or girl. Teachers--male and female--need to understand the best methods for helping children learn, even if the methods change with the subject matter, the sex of the child, and the individual child. There is no reason to expect that male teachers and female teachers cannot be equally prepared to teach boys as well as girls...
>
> I believe that the present review indicates that it is a false hope to flood the elementary schools with male teachers and expect the academic problems of boys to be solved. In 1931, Hewitt... was apparently ahead of the research when she suggested that the characteristics of good teachers are individually linked, not sex linked. She proposed that women teachers as well as men teachers are needed, but that they should supplement one another...
>
> In any case it is clear that research on the effects of teachers on academic achievement needs to get down to specifics such as characteristics of individual teachers and specific classroom and teaching aids and their effects on specific children in those environments. Research on global characteristics such as sex of teacher has not helped in understanding what to do about the problems of the academic achievement of elementary school children, particularly boys." (p. 400)

Harrison (1976) conducted a study to define those teacher characteristics that were related to gains in the reading achievement of students.

A review of the relevant literature indicated that the use of ideas and opinions expressed by students was positively related to achievement. Further, the past research indicated that teachers with highly developed conceptual structures helped children more often in defining and exploring problems, while teachers at lower levels of conceptual development preferred more dominative interactions. Harrison's own study indicated that autonomy, practical outlook, lecturing, abstract conceptual structures, and the number of only children were the most significant teacher variables in explaining variance in student reading gains.

In a similar vein, Grotberg (1969) concluded that teacher characteristics are important in determining the kinds of learning that children acquire and indeed, the kinds of social behaviors that children develop. While teachers are somewhat limited by their own biases in assessing children, their capacity to be resourceful, flexible, and supportive is important to the children's development. Further, children learn best what teachers stress most; thus, it seems important to determine what teachers plan to teach or what their teaching strengths are.

In reviewing Head Start research, Datta et al. (1976) came up with a variety of teacher characteristics that seemed to be related to greater improvement among Head Start children. Among their findings were the following:

- Greater cognitive gains were achieved with older teachers.
- Children whose teacher's level of general education and prior experience with children were relatively high performed less well on measures of preschool achievement and social adjustment than children whose teachers appeared less well qualified.
- The use of non-physical control resulted in greater gains on measures of cognitive abilities than the use of physical control to maintain discipline.

- Placing high emphasis on the goals of independence and self-care was related to greater gains in cognitive abilities, school readiness, and social adjustment than was placing low emphasis on these goals.

- Emphasis on child socialization was related to better social adjustment.

- Emphasis on language development was related to lower cognitive abilities and school readiness (the authors attribute this to self-report errors on the part of the teachers).

- The use of social-emotional interactions with children was negatively related to children's ability to learn new tasks.

- Structuring lessons was positively related to gains in learning ability and school readiness.

- The use of art related activity was positively related to school readiness.

- The use of creative small group instruction activities was positively related to gains in cognitive ability, school readiness, and ability to learn new tasks.

- The use of rote learning was negatively related to gains in learning ability.

Another variable that has received some attention in the past is the control strategy used by teachers in the classroom. Crocker et al. (1977) tried to integrate the varying results from these studies with "...the interesting hypothesis that a gradual shift may occur over time, with low control yielding more positive results only after a longer period. Thus, the two short-term studies...favored high control, the intermediate term study...showed no significant difference, while the longest study...yielded differences in favor of low control..." (p. 166). On the other hand, they also assert that "... teacher and pupil classroom roles possess an inherent stability that does not fundamentally change even under an apparent drastic change in the surface features of the class setting." Thus, it may just be very difficult to manipulate experimentally the kinds of control exerted by teachers in the classroom. Coker and Lorentz (1975, 1976) did find

teacher control and student coping styles to be related to student achievement in reading.

Finally, Moore and Schaut (1975) conducted two experiments to determine whether providing classroom teachers with feedback would result in changes in both teacher and student behaviors. They found that the experimental teachers (those who received feedback) demonstrated greater control over their teaching behaviors. Further, a second experiment showed significant differences in behavior between the experimental and control teachers, indicating that: (1) experimental teachers engaged in diagnosis more often; (2) they conceptualized and employed more appropriate process for diagnosis; and (3) their students performed better along certain dimensions than did the control students. The authors concluded that their study demonstrated the importance of conceptually appropriate feedback in bringing about changes in teacher behaviors.

School Level Variables

Classrooms obviously do not function in a vacuum. They operate within the constraints defined by the larger school, by the administrators of the school, the school district, and the community in which they are located. All of these can, potentially, have an impact on the dynamics of the classroom and on the achievement of students in the classroom. The impact of some of these potential sources of influence has been discussed in the literature, and will be summarized below.

A group of studies looked at the relationship between administrative behavior and school productivity. Stogdill (1974), for example, concluded that "... when teachers and principals are described high in consideration and structure, their pupils tend to make higher scores on tests of school

achievement" (p. 140). The dimension of consideration describes the extent of people-centeredness of those in supervisory positions (teachers and administrators), while the dimension of structure defines the extent to which supervisors are task oriented. Thus, from Stogdill's review, it may be deduced that pupil achievement is enhanced when the teachers and administrators stress both the task related and emotional needs of students. Maximum benefits can be obtained from an equal emphasis on both these dimensions.

Miller (1976) emphasized the importance of the school climate.

> "Obviously, if change is what is needed and desired, the traditional 'socialization' which tends to maintain the bureaucracy must be influenced. The research cited earlier points out the crucial role the school leader plays in increasing school productivity and pupil achievement. Efforts must be directed at helping principals to behave in ways which will 'open up' the school climate." (p. 338)

Therefore, Miller suggests not only that school climate is important in affecting the school achievement of students, but also that the school principal plays a pivotal role in the implementation of this process. With the appropriate training and skills, the principal could become an effective leader in restructuring the dynamics of the school. At the same time, Miller offers some cautions. "...It should be recognized that good leadership, like other healthy organizational dynamics, can enhance the implementation of bad programs as well as good ones. It is also important to be aware that the likelihood of a poor decision being reversed or modified in an open climate would be greater than in a closed situation."

> "To the tempting question of what kind of leadership is 'best,' an answer is typically attempted in educational, not organizational terms. Research that seeks to throw leadership styles against the criteria of educational outputs (e.g., school marks, standardized test results) becomes trapped in what may be termed 'the cognitive fallacy.' Good leadership, in and of itself, is a necessary but not a sufficient condition for a high cognitive payoff at the pupil level.

> The explanation lies in organizational, not educational terms. Good leadership, like other healthy organizational dynamics, enhances the probability of institutional policies being successfully implemented--good policies and bad policies alike. A school with top leadership, healthy climate, and open-minded teachers may be one in which the successful introduction of perhaps a new method of teaching arithmetic is facilitated. If the new method is good, leadership correlates with school marks; if the method is bad, the leadership at that school is going to look negative when the statisticians are through with it."

In general, the review of school climate and leadership styles indicates that much progress can be made toward achievement gains by developing leadership styles that emphasize both structure and consideration, by building a school climate that is open and where free exchange of information is encouraged.

In a longitudinal study conducted in a Middle school, Freebery (1978) emphasized the importance of taking into account the organizational structure of the school. In the school that constituted the research site for the study, total departmentalization was the rule, teachers being identified with the subject, and not the students they taught, and classes operating regimentally at the strike of a bell every 47 minutes. The revision in the structural characteristics of the school included the formation of interdisciplinary teams of teachers, so that each team was responsible for a group of students. A team consisted of four teachers, specializing in mathematics, science, social studies, and language arts respectively. In addition, bell scheduling was replaced with 'block scheduling,' which provided each grade level with different lunch and expressive arts periods. The remaining time on each schedule allowed teachers to block out instructional time in flexible ways. Further, team classrooms were located contiguous to each other, thus minimizing the amount of school-wide movement between classes. In addition, weekly meetings were conducted

between team teachers and students, and there were also parent conferences, professional staff conferences, and group planning sessions with team teachers. These structural changes facilitated feelings of belongingness for both the teachers and the students. In addition to the structural changes, emphasis was placed on staff training, supervision, and instructional programs. The major goals of this longitudinal study were to improve the reading achievement of students and to reduce the number of discipline problems in the school. The overall program resulted in improvements along both these goals. The author concluded that student achievement in reading will improve if reasonable skill objectives are set and if process feedback is provided regularly. Deviant student behavior is reduced by (a) allowing students an opportunity to be responsible for solving their own problems, (b) providing feedback to teachers on classroom interactions, (c) facilitating student and adult interaction on a social-personal basis, and (d) emphasizing positive behaviors and promoting positive self-image. These precursors of improvement can in turn be attributed in part to the structural changes and skill training that were undertaken as part of the study.

With a different perspective on the issue of structure, Sanders and Wren (1976) examined the effectiveness of open-space schools in determining the educational achievement of students. A review of the sporadic work done in this area led the authors to conclude that:

> "As a whole, these studies indicated that pupils in the open schools did at least as well as pupils in the traditional schools in measured cognitive achievement; there may be some tendency from boys to benefit from the open environment more than girls, in this respect; and academic achievement in the open classes improves dramatically over that of traditional classes in a long-term evaluation. (p. 62)

In addition to the effects on academic achievement, the researchindicated the development of favorable attitudes on the part of teachers, parents, and pupils during open school experience. The fear that anxiety could be heightened by an open-area learning situation was not justified by the results of these studies. In conclusion, the authors remarked that "open schools are effective."

Datta et al. (1976), while focusing on evaluating the effectiveness of Head Start programs, made some references to school characteristics of potential relevance to academic achievement. These authors found that the degree to which classes were structured was positively related to gains in school readiness and learning ability among Head Start children. In addition, the extent of teacher stability was also related to gains in various achievement areas. That is, the extent to which teachers did not turn over (so that students were interacting with the same adults) was related to the extent to which their students performed well in the classroom. While some teacher turnover may be beneficial, therefore, extensive changes in who is teaching may well have a detrimental impact on the academic progress of students, fostering in them a sense of turmoil and a lack of environmental stability.

In a critical review of the academic achievement of black students in desegregated schools, Bradley and Bradley (1977) referred to findings that have some relevance in the present context. One result reported in several studies was that the effective agent for changes in black student achievement was not school desegregation, but classroom desegregation. While studies reporting this finding have been criticized on methodological grounds, there may be some validity to the conclusion that changing the global environment may not have much impact on academic performance unless the proximate classroom environment undergoes parallel changes. The

authors offer the following suggestions in an attempt to provide directions for improving minority performance:

> "... effective interventions for improving the academic achievement of various cultural groups may be derived if more is known about the situational factors that positively or negatively affect the classroom motivation of these cultural groups...'Black students' academic performance... may be more effectively increased if the situational factors that maximize their classroom motivation may be delineated and replicated within their classrooms in both predominantly black and predominantly white schools." (p. 445)

These comments point out the need for a careful examination of the situational contingencies before a "quick-and-easy" solution to the poor academic performance of any group is provided.

In a study of the effects of various school, teacher, and student characteristics conducted by the Federal Reserve Bank of Philadelphia, Summers and Wolfe (1975), among other things, concluded that:

- All types of students at all levels of schooling experience larger rates of growth in achievement if they are attending more, and if unexcused absences and lateness are minimized.
- All types of students in elementary schools do better if they are taught by teachers who graduated from higher rated colleges, and if they are in schools with large proportions of high achievers.
- All types of students in senior high school do better if they are in smaller schools where dropouts are less of a problem.

Jackson (1975) undertook an examination of one of the control systems frequently used in schools to ensure minimally adequate performance; viz., grade retention. Grade retention is the practice of requiring a student who has been in a given grade level for a full school year to remain at that level for a subsequent school year. After a careful review of the research investigating the effects of grade retention, the author came to the following conclusions:

> "One general conclusion about the effects of grade retention relative to grade promotion is clearly warranted by all the results taken as a whole: There is no reliable body of evidence to indicate that grade retention is more beneficial than grade promotion for students with serious academic or adjustment difficulties. This is clearly indicated by the pattern of results... Thus, those educators who retain pupils in a grade do so without valid research evidence to indicate that such treatment will provide greater benefits to students with academic or adjustment difficulties than will promotion to the next grade." (p. 627, author's italics)

The author goes on to clarify that this conclusion should not be interpreted to mean that promotion is better than retention, but rather that the accumulated evidence is so poor that valid inferences cannot be drawn concerning the relative benefits of the two options. These comments serve to highlight another major issue that confronts educators today. In the absence of valid research data clearly indicating the superiority of one strategy or phenomenon over another, how should choices be made? On the basis of common sense? In the example of grade retention, should school boards be governed by their own personal preferences as to which strategy should be adopted by the school system? Clearly, these are hard questions to answer, and it is suggested here that systematic attention directed to these and similar issues may do much to improve the quality of education in schools.

General Comments

The diversity of the findings with respect to the potential impact of various school and classroom characteristics on the academic achievement of students is abundantly clear from the foregoing review. Even when the overall summaries of these findings are considered, one finds some reports that are diametrically opposed in their conclusions. A few of these will now be noted to illustrate the diverging conclusions that may be drawn from the research in this area.

Cohen and Smith (1972) and Spivack (1973) consider it a fallacy to assume that student achievement is significantly affected by organizational arrangements within the schools. They argue that differences in school resources (e.g., teachers, curriculum, facilities) or how they are organized (e.g., team teaching, ability grouping, and the like) appear to have little effect on achievement. School output, they argue, "simply does not seem to respond to variations in organization, resources, or consumer pressure" (Cohen and Smith, 1972). These authors go on to point out that these results are not due to the fact that research demonstrates the lack of existence of a relationship. Rather, their conclusions are based on the fact that little research has been done on the subject. In large part, the fallacious assumptions are based on extrapolations from individual level studies. But without reference to the institutional situation, there is simply "no way we can assess the impact which schools might have." (Cohen and Smith, 1972). These authors arrive at similar conclusions with respect to the impact of schools on student attitudes or values:

> "... we have been unable to turn up any evidence which suggests that schools have much of a differential effect on the attitudes or values of students... everything we have been able to turn up suggests that schools affect students' attitudes and values in roughly the same way as they affect their students' achievement. Their impact is quite uniform, and in comparison with background factors, quite modest."
> (Cohen and Smith, 1972)

Similar conclusions have been arrived at in other reviews of educational research. After an extensive review of the existing literature pertaining to school effectiveness, Averch et al. (1972) arrived at six major policy implications:

- Research has not identified a variant of the existing system that is consistently related to students' educational outcomes.

- Increasing expenditures on traditional educational practices is not likely to improve educational outcomes substantially.
- There seem to be opportunities for significant reduction or redirection of educational expenditures without deterioration in educational outcomes.
- Innovation, responsiveness, and adaptation in school systems decreases with size and depend on exogenous shocks to the system.
- Educational research is seriously deficient in terms of the size, scope, and focus of research efforts and in the integration of research results.
- Research tentatively suggests that improvement in student outcomes, both cognitive and noncognitive, may require sweeping changes in the organization, structure, and conduct of educational experiences.

In contrast to the pessimistic conclusions of these authors, other researchers have concluded that many of these variables are of primary importance in determining student achievement. Shea (1976), for example, concluded that:

"1. encouragement of educational goals by such significant others as teachers and guidance counselors depends somewhat on socioeconomic status, but more on student educational goals;

2. educational goal levels depend somewhat on socioeconomic origins, more on scholastic ability, and most on significant others' encouragement of educational goals;

3. academic performance depends somewhat on socioeconomic origins, but most on a combination of educational goal levels and scholastic ability." (pp. 509,511)

According to Shea, then, significant others such as teachers and other school personnel have a significant impact on the model of the academic achievement of students. He argues that both the individual (the student) and the environment are significant predictor variables, and both should be taken into account in such a model. "The recognition that educational attainment is comprised of a dynamic relationship between perception of opportunity and changing opportunity implies an emphasis on process, and this

refers to what happens in schools and classrooms during a student's encounter with the educational system."

The author goes on to point to some of the problems inherent in determining the relationship between school variables and student achievement. According to Shea, the most obvious way to equalize educational opportunities is to insure that facilities are equally disbursed. But even such insurance does not necessarily result in equal outcomes, partly because outcomes are not equally received. In addition, if all the relevant input variables were measured, it would be apparent that even equally disbursed resources may turn out to be unequal. These comments serve to highlight the importance of ensuring that the relevant variables are measured, not only with respect to intent, but also with respect to their actual state.

Other inconsistencies in the variables and methods used may serve to explain further the divergent results of many of the studies in the area. One significant difference centers around the definition of the dependent variable. In the foregoing discussion, student achievement has been used as though it were a uniform, unidimensional construct. In contrast, however, there are probably as many operationalizations of this variable as there are studies. Researchers have used criteria of student achievement ranging from IQ scores, grade point averages, achievement scores in much specialized areas as reading, arithmetic, teacher ratings. That different findings emerge with the use of different criterion variables should be hardly be surprising. Further, some researchers have used student attitudes and values toward academic achievement as their criterion variable. Using an even wider definition, some researchers examine the social,

emotional, as well as the intellectual development, of students in studies of academic achievement. The definition of what exactly constitutes academic achievement is at the core of many of the problems facing someone who wishes to reconcile the divergent results provided by relevant studies.

As with the criterion variable, problems abound with respect to the predictor variables of interest. Thus, for example, class size discussions frequently get bogged down with the issue of how to define optimal class size. Much of the inconsistency in the findings can be explained in terms of varying definitions of what constitutes a large and a small class. Unless uniform definitions are used across research studies, it is impossible to arrive at an integrative understanding of the effects of varying class sizes on academic achievement. Similar problems are encountered when self-reports are used to measure the various predictor variables. Even when one researcher uses a predictor variable that has known psychometric properties, it is impossible to compare the results of one study with another unless the same measure is used in both. In addition to uniformity of definitions, uniformity of measurement tools is essential to a comprehensive understanding of the problem.

Another issue that has beclouded some of the findings is that of the unit of analysis. Some studies use individual performance as the criterion. Others are interested in the total class performance. Still others may focus on the performance of the entire school. Researchers with a different perspective may compare the performance of one subgroup; e.g., blacks, with that of another; e.g., white. Thus, the unit of analysis can range from the individual to various aggregate bodies that serve as the focus of a researcher's interests. Great care must be exercised when generalizing across units of analysis, and lack of this care may be at fault in some of the inconsistent findings reported in the literature.

Finally, another issue that may be responsible for some of the inconsistencies is comparison across age/grade levels. It is quite likely that factors that affect the academic achievement of very young children are quite different from those that affect the academic achievement of teenagers. Thus, what appears at first glance to be an inconsistency may actually be a developmental phenomenon.

SUMMARY OF FINDINGS

Classroom Variables

- Under certain circumstances, class size may be negatively related to academic achievement, but a variety of process variables moderates this relationship. Overall, no consistent results have been found with respect to the impact of class size on academic achievement.

- With respect to the kinds of reward structures that have been used in classrooms, the most consistent positive effects have been obtained with the use of individual competition.

- The format of teaching used (lectures, discussions, etc.) bears no consistent relationship with student achievement.

- Emphasizing the learning of social skills in the classroom may facilitate academic achievement.

- With respect to team teaching versus solitary teacher teaching, the superiority of one over the other has not been consistently demonstrated.

- There is no consistent evidence to indicate that same-sex teachers facilitate classroom learning.

- Teachers who have a highly developed cognitive structure facilitate the academic performance of their students.

- In general, students tend to learn best what their teachers emphasize most.

- The style of teaching used by teachers in the classroom may have a significant impact on student learning. In general, non-physical control appears to be superior; when teachers are not directive, longitudinal gains in student achievement may be elicited.

- Providing teachers with appropriate feedback regarding their teaching styles may lead to improvements, not only in teacher behaviors, but in student behaviors as well.

School Level Variables

- Administrative behavior is important to student achievement. Administrators should emphasize both consideration and structure in their leadership styles. The principal's role is crucial to the better performance of students.

- The climate in the school should be open, with exchange of information and sharing of ideas being encouraged.

- The structural arrangements of the school should be designed so as to promote feelings of belongingness on the part of students and teachers, which in turn facilitates student achievement.

- The way that the classroom itself is structured is important in student achievement.

- Open schools are at least as effective as traditional schools in promoting student achievement.

- It is important to maintain a certain degree of staff stability. Excessive teacher turnover is negatively related to student performance.

- If gains in student achievement are to be realized, school-level changes should be paralleled by classroom changes. For example, school desegregation must be accompanied by classroom desegregation if gains in student achievement are to be realized.

- The use of control mechanisms, for example, grade retention, does not necessarily lead to gains in student achievement.

POLICY IMPLICATIONS

Because of the relative dearth of consistent information about the environmental factors which are related to the academic achievement of students, it is rather difficult to draw clear-cut implications regarding the school, classroom, and teacher characteristics that could be altered. Before even tentative conclusions are drawn, it is wise to point to some cautions that should be kept in mind when examining these conclusions. First, it is clear from what research exists that no one solution applies across-the-board to all schools, all classrooms, all teachers, and all students. Thus, the contingencies of the specific situation must guide, to a large extent, the kinds of policies that are implemented. Second, the process of <u>how</u> a policy is implemented is often as important as the substance of <u>what</u> is being implemented. The literature is replete with examples of individuals rejecting decisions that are imposed from the top down. In contrast, when those who are affected by a particular decision are involved in the decision-making process, they are much more likely to be committed to the decision, and have a greater investment in the successful implementation of the decision. Third, it is important to examine all potential consequences of a particular decision before implementing it. Thus, while a particular decision may result in apparent gains in student grades, it might at the same time have deleterious effects on students' social or emotional well-being. If most, if not all, of the potential consequences of a decision are known in advance, it is possible to make an informed choice about the trade-offs between the benefits and the risks of that decision. Finally, careful monitoring is required to ensure that the decision is being implemented as intended.

The foregoing cautions make it quite clear that there are no "quick-and-easy" remedies that can be applied across-the-board to alleviate problems in student achievement. Systematic and thorough attention to some phenomena may, however, start movement in the right direction. Some issues that merit such attention are discussed below.

- The leadership style of the principal is crucial in determining the effectiveness of the school as a whole. A principal who is trained in process skills as well as the substantative requirements of his/her role is likely to be more effective. It may be beneficial, therefore, to spend some time and money to ensure that the school principal has the requisite process skills. These process skills include an ability to place emphasis on the task as well as the socio-emotional needs of staff and students.

- In addition to possessing the requisite skills himself/herself, the principal should be able to promote such skills among staff. If teachers are similarly disposed to pay attention to both the curriculum and the student, much could be gained in the area of student achievement.

- The climate of the school should be open, where information is shared freely, and ideas exchanged openly. Secrecy in administration only leads to misinformation at the lower levels, and mistrust between supervisors and subordinates.

- Regimentation and excessive structuring of student schedules may cause students to feel alienated from the school situation, which in turn could have a negative impact on academic performance. As far as possible, the physical, procedural, and social structure of the school should be such that it fosters feelings of belongingness among students and staff.

- Some attention needs to be directed to staffing. Excessive teacher turnover may have a negative impact on student performance. While some turnover is probably desirable, it is important to maintain some degree of stability during and between school years.

- Control mechanisms such as grade retention, etc., should be used with the knowledge that their superiority in enhancing student performance has not been demonstrated.

- In certain circumstances, it might be more effective to have small classes. But it is not the sheer number of students in a classroom, but rather the process that ensues, that is the important antecedent variable. It is, therefore, more fruitful to ensure

that the process in the classroom is appropriate to the subject matter of the class than simply to reduce the number of students in any particular class.

- Designing the reward structure of the classroom so that is promotes healthy competition among the students in the class may lead to some gains.

- Since it is apparent that students learn best what the teachers emphasize most, a careful evaluation of the priorities about what should be emphasized would probably be beneficial.

- A high degree of directive activities in the classroom may have a negative impact on student achievement. As far as possible, teachers should minimize the extent to which they use controlling behaviors in the classroom.

- The use of physical control is not beneficial.

- Providing teachers with conceptually appropriate feedback about their teaching styles and behaviors may lead to improvements in teaching styles and, indirectly, have an impact on student performance. In order to provide such feedback, it is probably necessary for colleagues and administrators to visit classes occasionally, which requires expenditure of limited time resources as well as the cooperation of the relevant teachers. The payoff in terms of student achievement might, however, be worth the costs.

- Some attention to developing social skills among students may lead to complementary gains in student achievement.

- Team teaching should be used when it appears to be appropriate to the subject matter being taught.

- A racially and sexually balanced staff of teachers provides students with different demographic characteristics as well as the appropriate role models. This, in turn, may have a positive impact on achievement.

- The changes made at the school level should be reflected, as far as possible, in changes at the classroom level. Thus, an open climate in the school should be reflected in an open climate in the classroom; desegregated schools should have desegregated classes; and so on.

Obviously, the task of improving student achievement is not a simple one. Any policy changes that are implemented will probably not show any results for at least a year or two. With broad-based commitment to changes, with changes in organizational structure, climate, skills, and with experience, it is hoped that the long-term effects would far outweigh the costs of im-

plementing changes in the steady state of the school. People looking for "quickie" solutions that result in immediate and dramatic results will, however, be deceiving themselves.

RESEARCH IMPLICATIONS

A research study designed to examine the impact of various school and classroom variables on student achievement basically would have little educational research to provide an existing theoretical base. While much educational research has focused attention on characteristics of the individual students, their socioeconomic backgrounds, and their children environment as determinants of their school performance, the impact of the organizational properties of the school and the classroom has remained relatively unexplored. In the following paragraphs, some of the relevant organizational antecedents of school performance are highly outlined. A research endeavor encompassing these variables could contribute much to the understanding of the determinants of student achievement.

Structural Variables. These variables define, not the physical, but rather the procedural, structure of the school. Standardization, for example, refers to the extent to which policies and procedures of the school across the various functional subunits of the school. Do all teachers have to follow the same rules and regulations, the same methods and techniques, etc.? Formalization refers to the extent to which these policies and procedures have official sanction. Are rules and regulations written down? Do they take the form of policy that is strictly enforced: Differentiation refers to the extent to which the functions of the school are allocated to subunits within the school. Is discipline the exclusive domain of one subgroup of school personnel? Do teachers overlap in their functions with counselors? Integration is the complementary concept to

differentiation, and refers to the extent to which the functions of the different subunits are coordinated. These and other structural properties of the organization have been shown to have an impact on organizational effectiveness. To the extent that the academic performance of students defines the criterion for the effectivenss of a school, these structural properties are relevant in assessing the precursors of school effectiveness.

Organizational Climate. The social and emotional environment that prevails in an organization is of vital importance in determining the attitudes of members toward the organization. If the climate is one of openness and honesty, attitudes are likely to be significantly more favorable than if they are not. Attitudes toward the organization define, to a certain extent, the degree of commitment organizational members have to the goals of the organization. School personnel, including staff and students, are much more likely to strive for school effectiveness in a climate of openness and honesty. The kind of social climate prevailing in the school is, then, a relevant precursor of school effectiveness.

Leadership Styles. There are at least two aspects of the organizational mandate that leaders can choose to focus on--the members of the organization or the task of the organization. It has been shown in the research literature that a leader who emphasizes task functions exclusively may prove detrimental to organizational effectiveness in the long run. Ideally, emphasis on both these aspects of leadership is necessary. In addition, a participative style of leadership is associated with greater effectiveness in a large number of situations. The leadership style of the school principal is therefore relevant in assessing the effectiveness of the school as a whole. It is significant for another reason as well. The

style of leadership that the principal chooses to adopt may have some impact on the leadership styles of other school staff.

Job Characteristics. Aspects of the specific jobs of the school staff have a major impact on the quality of the job performed by employees. Various job characteristics are of relevance here. Autonomy defines the extent to which the individual; e.g., the teacher, feels free to make job-related decisions. Variety refers to the extent to which the individuals feel they are doing the same thing over and over. Task Impact refers to the extent to which individuals feel that their work has made a difference. Task Completeness refers to the ability of an individual to complete the task from beginning to end. Feedback refers to the extent to which doing the job itself, or external agents such as peers and colleagues, provide the individual with knowledge about how well he/she is doing the job. All these characteristics of the job will determine how well the teacher teaches, the principal administers, etc.

Working Conditions. The physical and social conditions in the school will have some bearing on the performance of the school. Physical working conditions include such factors as heat, temperature, noise. Resource Adequacy defines the extent to which school personnel have the necessary materials, equipment, and information, necessary to do the job well. Membership Rewards include the pay, fringe benefits, chances for promotion, job security, that the school offers its employees as remuneration for their services. Safety, both physical and psychological, has become a particularly relevant aspect of working conditions in schools recently, as violence is on the increase.

Interpersonal Relationships. In a school, there are various interpersonal links that have relevance. These include the links between

administrators and teachers, between teachers themselves, between administrators, between administrators and students, between teachers and students, and among students. The extent to which individuals form cohensive groups, to which they are willing to stand up for each other, to which they define rigid norms, etc. will have a significant impact on school performance.

Individual Characteristics. These variables refer to the qualifications, demographics, personalities, styles, of the school personnel including the administrators, teachers, and students. These individual characteristics in isolation, and in combination with characteristics of the other relevant groups, will have an impact on student achievement.

Control Systems. These systems define the rules and regulations determining the rewards and punishments meted out to school members, staff and students alike. To the extent that rewards and punishments are linked to good and bad performance, respectively, these control systems will be effective in promoting good performance and extinguishing bad performance. Merely because policy defines that rewards are provided for good performance does not, however, necessarily mean that individuals will perceive this link. In addition to making performance-reward connections, then, it is important that school members perceive this link.

The Issue of the Dependent Variable. It is relatively easy to say that school effectiveness is defined by the performance of the students in the school. It is, however, very complicated to define exactly what constitutes student performance. This issue was discussed earlier in this report. In terms of a research study, the present writer is included to embrace a rather broad definition of student performance. It is not just the

intellectual development of a child, but the social, emotional, and psychological development of the child as well, that are seen as the goals of schooling by the present writer. This broader definition complicates the task of measuring the dependent variable still further. Simple IQ measurement is not sufficient. Further, the effects of innate versus environmental characteristics have to be separated out in an assessment of the impact of the school on the academic performance of students. Rather than rely on some artificial measurement such as grade points, measures that necessarily must discriminate (perhaps unjustifiably) among students, it is suggested that the dependent variable be measured through reports of knowledgeable persons. Thus, teachers, other students, counselors, others who come into intimate contact with an individual student are the best sources of information about the social, emotional, and intellectual growth of that student.

A study encompassing all these variables simultaneously, and across a variety of different school settings, is necessary before we can begin to disentangle the effects of different aspects of the school environment on the performance of students.

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